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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/618,377

07/11/2003

Edward J. Swenson

50001/97:1

4894

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7590

12/03/2004

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EXAMINER

NOVACEK, CHRISTY L

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 12/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/618,377	<b>Applicant(s)</b> SWENSON ET AL.	
	<b>Examiner</b> Christy L. Novacek	<b>Art Unit</b> 2822	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 July 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-14 and 17 is/are rejected.
- 7) ☒ Claim(s) 2,15,16 and 18-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/11/03</u> . | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This office action is in response to the communication filed July 11, 2003.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 4, 7-10, 12-14 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al. (US 6,580,054).

Regarding claim 1, Liu discloses forming in a ceramic substrate (14) a scribe line that facilitates breakage of the ceramic substrate into separate pieces having side margins defined by the scribe line, the ceramic substrate having a thickness and a surface on which is formed a pattern of multiple nominally identical mutually spaced apart electronic components and the electronic components separated by streets along which the scribe line is formed such that the separate pieces created by breakage of the ceramic substrate include separate circuit components. Liu discloses aligning an ultraviolet (UV) laser beam characterized by an energy and a spot size with one of the streets on the surface of the substrate, imparting relative motion between the UV laser beam and the substrate such that the laser beam is directed lengthwise along the street and effects depthwise removal in the absence of appreciable melting of the ceramic substrate material so that the trench formed in the ceramic substrate material has a width that converges from the

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surface to a trench bottom in the form of a sharp snap line. Liu discloses the shape of the trench forming a region of high stress concentration extending into the thickness of the ceramic substrate and along the snap line so that, in response to a breakage force applied to either side of the trench, multiple depthwise fractures propagate into the thickness of the ceramic substrate in the region of high stress concentration to effect clean breakage of the ceramic substrate into separate circuit components having side margins defined by the snap line.

Regarding claim 3, Liu discloses that the trench is generally “V-shaped” (inverted triangle) (col. 8, ln. 30-40).

Regarding claim 4, Liu discloses using the same type of laser (UV YAG), the same wavelength of laser beam (355nm) and same pulse energy (10/100 J/cm<sup>2</sup>). Therefore, it appears that the laser beam of Liu would inherently possess the function of minimizing resolidification of the ceramic substrate along the sidewalls of the trench. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) “where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on ”); and *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) (a case indicating that the burden of proof can be shifted to the applicant to show that the subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Regarding claim 7, Liu discloses that the laser beam may have a wavelength of 150-560nm.

Regarding claim 8, Liu discloses multiple scribe lines are formed in the ceramic substrate (Fig. 7).

Regarding claim 9, Liu discloses that the laser beam may have an energy per pulse of 50-1000  $\mu\text{J}$  (pulse size 5-25 $\mu\text{m}$  diameter and pulse energy of 10-100  $\text{J}/\text{cm}^2$ ).

Regarding claim 10, Liu discloses that the scribe line may be formed by a single pass of the laser beam.

Regarding claim 12, Liu discloses that the repetition rate of the laser beam is 10-50 kHz.

Regarding claim 13, Liu discloses that the laser is operating at a power of 1.0 W.

Regarding claim 14, Liu discloses that the trench has a width of 10-15  $\mu\text{m}$ .

Regarding claim 17, Liu discloses that the ceramic substrate has an upper surface and a lower surface and one of the surfaces has printed on it a pattern that facilitates the alignment of the street and the ultraviolet laser beam as it moves lengthwise down the street.

Claims 1, 5-8, 10, 11 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Brown et al. (US 6,413,839).

Regarding claim 1, Brown discloses forming in a ceramic substrate (14) a scribe line that facilitates breakage of the ceramic substrate into separate pieces having side margins defined by the scribe line, the ceramic substrate having a thickness and a surface on which is formed a pattern of multiple nominally identical mutually spaced apart electronic components and the electronic components separated by streets along which the scribe line is formed such that the separate pieces created by breakage of the ceramic substrate include separate circuit components. Brown discloses aligning an ultraviolet (UV) laser beam characterized by an energy and a spot size with one of the streets on the surface of the substrate, imparting relative motion between the

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UV laser beam and the substrate such that the laser beam is directed lengthwise along the street and effects depthwise removal in the absence of appreciable melting of the ceramic substrate material so that the trench formed in the ceramic substrate material has a width that converges from the surface to a trench bottom in the form of a sharp snap line. Brown discloses the shape of the trench forming a region of high stress concentration extending into the thickness of the ceramic substrate and along the snap line so that, in response to a breakage force applied to either side of the trench, multiple depthwise fractures propagate into the thickness of the ceramic substrate in the region of high stress concentration to effect clean breakage of the ceramic substrate into separate circuit components having side margins defined by the snap line.

Regarding claim 5, Brown discloses that the snap line is formed at a depth that does not appreciably penetrate the ceramic substrate thickness, thereby minimizing the formation of microcracks extending perpendicular to the scribe line formed in the substrate (col. 5, ln. 54-57).

Regarding claim 6, Brown discloses that the depth of the snap line can be 1 to 3 mils deep in a 13 mil thick wafer (snap line is 7.7%-23.1% of the wafer thickness).

Regarding claim 7, Brown discloses that the laser beam can have a wavelength of 248nm.

Regarding claim 8, Brown discloses multiple scribe lines are formed in the ceramic substrate.

Regarding claim 10, Brown discloses that the scribe line may be formed by a single pass of the laser beam.

Regarding claim 11, Brown discloses that the scribe line may be formed by multiple passes of the laser beam.

Regarding claim 14, Brown discloses that the trench can have a width of 10-20 microns.

*Allowable Subject Matter*

Claims 2, 15, 16 and 18-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The primary reason for the indication of the allowable subject matter of claim 2 is the inclusion therein, in combination as currently claimed, of the limitation of the UV-laser diced ceramic substrate having electrical components thereon which consist essentially of resistors and capacitors. This limitation is found in claim 2 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The primary reason for the indication of the allowable subject matter of claims 15 and 16 is the inclusion therein, in combination as currently claimed, of the limitation of the ceramic substrate having an upper or lower with a layer of metal coated thereon. This limitation is found in claims 15 and 16 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The primary reason for the indication of the allowable subject matter of claims 18 and 19 is the inclusion therein, in combination as currently claimed, of the limitation of the ceramic substrate having streets that intersect opposing margins of the substrate at oblique angles. This limitation is found in claims 18 and 19 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The primary reason for the indication of the allowable subject matter of claim 20 is the inclusion therein, in combination as currently claimed, of the limitation of one of the streets



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including a metal layer. This limitation is found in claim 20 and is neither disclosed nor taught by the prior art of record, alone or in combination.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN  
November 24, 2004

  
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